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### Appendices

#### Appendix A: Materials required when performing a local anaesthesia or regional block in children (Dalens, 1999)

<table>
<thead>
<tr>
<th>Block Procedure</th>
<th>Recommended Device</th>
<th>Alternate Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intradermal wheals</td>
<td>Intradermal needles (25 G, 25 mm long)</td>
<td>–</td>
</tr>
<tr>
<td>Local infiltration and field blocks</td>
<td>Standard IM needles (21-23 G, 25-50 mm long)</td>
<td>–</td>
</tr>
<tr>
<td>Compartment blocks (fascia iliaca, penile, rectus sheath, peribulbar blocks)</td>
<td>21-23 G short (25-50 mm) and short bevel</td>
<td>Epidural needles (especially Tuohy needles for intercostal block) Neonatal spinal needle</td>
</tr>
<tr>
<td>Peripheral mixed nerve blocks and plexus blocks</td>
<td>Insulated 21-23 G short bevel needles of appropriate length (depending on block procedure and patient's size) Nerve stimulator (0.5-1 mA)</td>
<td>Unsheathed needles with the same characteristics connected to a nerve stimulator (0.5-1 mA)</td>
</tr>
<tr>
<td>Spinal anaesthesia</td>
<td>Spinal needle (24-25 G; 30, 50 or 100 mm long, Quincke bevel, stylet) Neonatal lumbar tap needle (22 G, 30-50 mm long) Whitacre spinal needle</td>
<td></td>
</tr>
<tr>
<td>Caudal anaesthesia</td>
<td>Short (25-30 mm) and short bevel needle with stylet</td>
<td>Neonatal epidural needle (intraoperative catheter insertion) Occasionally: spinal needle IV short catheter; not recommended</td>
</tr>
<tr>
<td>Epidural anaesthesia</td>
<td>Tuohy needle (22 G and 30 mm long, 20 G and 50 mm long, 19-18 G and 80-90 mm long); LOR syringe and medium; Epidural catheter</td>
<td>Crawford, Whitacre, or Sprotte epidural needles appropriately sized; LOR* syringe and medium Epidural catheter</td>
</tr>
</tbody>
</table>

*LOR = Loss of Resistance*
Appendix B: Questionnaire used during the survey of regional anaesthetic procedures.

The questionnaire was developed after an extensive literature review and also by means of feedback obtained from anaesthesiologists who completed a pilot questionnaire while attending a regional anaesthesia workshop at the Department of Anatomy, University of Pretoria (see Table B1). This pilot study provided useful information on shaping the questionnaire. Every data-item on the questionnaire was given a numerical value for all eight questions. The data for every procedure was then entered into the Excel® statistical program.

Table B1: Example of questionnaire given to anaesthesiologists.

<table>
<thead>
<tr>
<th>Questions</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I perform this procedure in my practice.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. How many times did you perform this procedure in the past year?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. The performance of this procedure is important in my practice situation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I feel comfortable to perform this procedure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I find difficulty to perform this procedure due to the following reason/s: (order in level of importance)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I met the following complication/s and have the following difficulties when performing the procedure (number in order of frequency)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. The improvement of critical anatomy knowledge necessary to perform this procedure will reduce difficulties and complications.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Improvement of anatomy knowledge necessary for the procedure will increase my confidence in performing the procedure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After an extensive search of the literature, a total of 17 paediatric regional anaesthetic procedures were selected for the survey (see Table B2).
Table B2: List of 17 paediatric regional anaesthetic procedures included in the questionnaire.

<table>
<thead>
<tr>
<th>Paediatric regional anaesthetic procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neuraxial/central blocks</strong></td>
</tr>
<tr>
<td>1. Caudal epidural block</td>
</tr>
<tr>
<td>2. Spinal anaesthesia</td>
</tr>
<tr>
<td>3. Lumbar epidural block</td>
</tr>
<tr>
<td>4. Thoracic epidural block</td>
</tr>
<tr>
<td><strong>Peripheral nerve blocks</strong></td>
</tr>
<tr>
<td>1. Infraclavicular brachial plexus block</td>
</tr>
<tr>
<td>2. Supraclavicular brachial plexus block</td>
</tr>
<tr>
<td>3. Femoral nerve block</td>
</tr>
<tr>
<td>4. Lateral femoral cutaneous nerve block</td>
</tr>
<tr>
<td>5. “3-in-1” block</td>
</tr>
<tr>
<td>6. Fascia iliaca block</td>
</tr>
<tr>
<td>7. Psoas compartment block</td>
</tr>
<tr>
<td>8. Sciatic nerve block: Anterior approach</td>
</tr>
<tr>
<td>9. Sciatic nerve block: Posterior approach</td>
</tr>
<tr>
<td>10. Sciatic nerve block: Lateral approach</td>
</tr>
<tr>
<td>11. Ilio-inguinal/Iliohypogastric nerve block</td>
</tr>
<tr>
<td>12. Penile block</td>
</tr>
<tr>
<td>13. Intercostal block</td>
</tr>
</tbody>
</table>
Appendix C: Results of survey into paediatric regional anaesthesia in South Africa.

Procedures were scored to best represent the selection criteria of the study, portraying a block that is performed, has anatomically related difficulties and complications associated with it, and where improvement of anatomical knowledge will make a difference in reducing difficulties and complications and increase confidence of performance. The five “problem” procedures are shown in Table C1.

Table C1: Procedures that scored the highest points, according to the scoring option.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Score</th>
<th>Incidence of Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoral nerve block</td>
<td>9/12</td>
<td>22.5%</td>
</tr>
<tr>
<td>Brachial plexus block</td>
<td>9/12</td>
<td>22.5%</td>
</tr>
<tr>
<td>Caudal epidural block</td>
<td>8/12</td>
<td>63.75%</td>
</tr>
<tr>
<td>Ilio-inguinal/iliohypogastric nerve block</td>
<td>8/12</td>
<td>26.25%</td>
</tr>
<tr>
<td>Lumbar epidural block</td>
<td>8/12</td>
<td>20%</td>
</tr>
</tbody>
</table>

The results from the questionnaires were analysed and the importance, comfort levels and possible difficulties that an anaesthesiologist may experience when performing one of the five “problem” procedures is summarised in Table C.2.
Table C2: Importance rating, comfort levels and possible difficulties associated with the most frequently performed procedures.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>% that believe block to be important</th>
<th>% that feel comfortable performing the block</th>
<th>% that has difficulties with…</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>knowledge of procedure</td>
<td>necessary equipment</td>
</tr>
<tr>
<td>Caudal epidural block</td>
<td>80.4%</td>
<td>9.8%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Lumbar epidural block</td>
<td>43.8%</td>
<td>0%</td>
<td>37.6%</td>
</tr>
<tr>
<td>Brachial plexus block</td>
<td>44.4%</td>
<td>27.8</td>
<td>22.3%</td>
</tr>
<tr>
<td>Femoral nerve block</td>
<td>72.2%</td>
<td>22.3%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Ilio-inguinal/iliohypogastric nerve block</td>
<td>66.7%</td>
<td>19.1%</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

The specific anatomically related complications associated with each of the five “problem” procedures, as well as the frequency of occurrence is summarised in Table C3.
Table C3: Complications experienced during the performance of the five “problem” procedures.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Caudal epidural block</th>
<th>Lumbar epidural block</th>
<th>Brachial plexus block</th>
<th>Femoral nerve block</th>
<th>Ilio-inguinal/iliohypogastric nerve block</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty palpating landmarks for needle insertion</td>
<td>47.1%</td>
<td>12.5%</td>
<td>39.0%</td>
<td>39.0%</td>
<td>33.4%</td>
</tr>
<tr>
<td>Injection into sacral bone marrow</td>
<td>29.4%</td>
<td>37.5%</td>
<td>44.4%</td>
<td>44.4%</td>
<td>Nerve trauma 23.8%</td>
</tr>
<tr>
<td>Difficulty piercing the SC ligament</td>
<td>33.3%</td>
<td>Lesions to IV discs and ligaments</td>
<td>6.3%</td>
<td>Nerve trauma 11.2%</td>
<td>Nerve trauma 10.2% Blocking of femoral nerve 14.1%</td>
</tr>
<tr>
<td>Vascular puncture</td>
<td>25.5%</td>
<td>Trauma of the spinal cord and nerve roots</td>
<td>12.5%</td>
<td>Pneumothorax 5.6%</td>
<td>Partial or incomplete block 61.9%</td>
</tr>
<tr>
<td>Dural puncture</td>
<td>17.7%</td>
<td>Vascular puncture</td>
<td>6.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-arachnoid injection</td>
<td>11.8%</td>
<td>Misplacement of epidural catheter</td>
<td>18.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misplacement into soft tissue or rectum (pelvic viscera)</td>
<td>23.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* SC = Sacrococcygeal
* IV = Intervertebral
Participating anaesthesiologists were also asked to score whether they (1) Strongly agreed, (2) Agreed, (3) Disagreed or (4) Strongly disagreed with the statements: Increased clinical anatomy knowledge will decrease complications (see Figure C1) and Increased clinical anatomy knowledge will increase confidence (see Figure C2).

**Figure C1:** Importance of clinical anatomy knowledge in decreasing complications.

**Figure C2:** Importance of clinical anatomy knowledge in increasing comfort levels.